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FINAL TECHNICAL REPORT

ONR Grant No. N00014-89-J-1943
"Plastics Pollution Control Technology Research"

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January, 1992

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FINAL PROJECT REPORT

ONR Grant No. N00014-89-J-1943
"Plastics Pollution Control Technology Research"

PRIMARY OBJECTIVES AND SCOPE OF THE PROJECT:

During the past two years, The Keystone Center has continued to convene the participants in the Keystone Dialogue on Navy Plastics Pollution Control. Participants have been working with Navy personnel during this time period to implement the recommendations from the report, Reducing Navy Plastic Pollution (1986) which outlined means to comply with the MARPOL Treaty.

TECHNIQUES OR APPROACHES USED:

As a part of the process, the Dialogue participants (see attached participant list) have been meeting with Navy personnel from NAVSUP, David Taylor Research Laboratory, and the U.S.S. Lexington Demonstration Project. The discussions have focused on: the development of new machines which will compact and process plastic and eliminate the need for storage of food waste; substitutions and reduction efforts in the supply centers and on-board ships; and the results of the recycling demonstration project involving the U.S.S. Lexington and ships based at Norfolk. The majority of the meetings occurred in Washington, D.C.

To broaden the Dialogue participant's understanding of the constraints and potential for reducing plastics on-board ships, the participants have taken several tours, the U.S.S. Lexington and the David Taylor Research Laboratory, and been briefed by the Pensacola Supply Center and NAVSUP.

In August 1990, the Dialogue participants travelled to Florida to meet with the staff of the U.S.S. Lexington and the Pensacola

Supply Center. They toured the ship to see firsthand the efforts to reduce the plastics and to segregate plastic from other waste and food contaminated plastic from other plastics. While on-board ship, they met with Navy personnel to obtain their observations of what was and was not working. The group toured the supply center to see how supplies are handled in general and specifically to see how the center has been reducing the amount of plastic which goes on-board ship. The amount of plastic being put on the U.S.S. Lexington has been reduced by substituting non-plastic items for plastic items where possible and eliminating the use of shrink wrap and other plastic wrappings from supplies going on-board ship. For example, they removed plastic wrap from flashlight, placed parts in paper instead of plastic bags and used re-useable sidewalls instead of shrink wrap for transporting pallets of supplies.

In March 1991, the Dialogue participants were briefed by NAVSUP including Rear Admiral James E. Miller, Vice Commander of NAVSUP. During the briefing, participants were shown how NAVSUP had successfully reduced or eliminated plastic in packaging requirements for over 120,000 Navy-managed items. It was also explained to participants that NAVSUP is working with the Defense Logistics Agency and General Services Administration items which comprise the bulk of what the Navy uses. The participants were also shown how the Navy is changing food management procedures, specifications and packaging to assist in the reduction of food-contaminated plastics generated on-board ship.

In June 1991, the Dialogue participants met at David Taylor Research Laboratory to see the various machines, the plastics processor, the pulper, and the compactor, being developed to address the plastics problem firsthand. The Dialogue participants were given demonstrations of all three machines in operation. In addition, the results of the Recycling Demonstration Project were presented. The participants were shown examples of the type of "plastic lumber" materials which were being made from the recycled plastics. It was noted that with this effort, the Navy was the

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first organization in the United States to successfully recycle post-consumer waste such as plastic wrap and milk bladders.

FINDINGS AND IMPLICATIONS:

At end of the contract period, the Navy is approaching the deadline for completion for the congressionally-mandated three year report on its efforts to comply with the MARPOL treaty. Throughout the past year, the Dialogue participants have reviewed the report's outline and a draft version. Within that context, the group has been reviewing and discussing the progress made to date as well as the Navy's potential to meet the five year deadline required by Congress. They have also provided the Navy with input on the presentation, readability and understandability of the report.

During the next contract period, the Dialogue participants expect to review the final draft of the report and provide additional input before the report is finalized and sent to Congress. Once the report is finished, the Dialogue group will determine it future direction.

TECHNICAL INFORMATION:

Attached to provide additional information on the Dialogue's efforts during the past two years are copies of meeting summaries prepared for participants.

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NAVY PLASTICS DIALOGUE
MAY 11, 1990
MEETING SUMMARY

Dr. Lesnick began the meeting by welcoming everyone especially those who are new to the dialogue. He then asked everyone to introduce themselves since there has been some one-for-one replacement of Navy personnel. Before going around the table, he introduced several new personnel from the Keystone Center. First, he introduced Martha Tableman who will be working on the Navy Plastics dialogue. He then introduced Abby Dilley and explained that she will be the primary person in the Keystone Center's new Washington Office.

After introductions were made, Dr. Lesnick provided some brief background on the Dialogue's efforts to date. He noted that this dialogue group has been through a lot and has accomplished a lot. Over the period of its existence the participants have developed good personal relationships that enable everyone to speak frankly. He noted that the reservoir of goodwill will be needed to make progress in the future.

Dr. Lesnick then quickly reviewed the history of the Dialogue. The Navy Plastics Dialogue's first report was released in June 1988 and is seen by everyone as being very successful. However, since the issuance of the report, it has been more difficult to get participants' attention on this issue. Several reasons for the lack of attention were identified. They were : 1) the issue was no longer high priority on people's agendas after the release of the report, and 2) within the Navy, there has been lots to do as an offshoot of the first report, thus, there has been little time to attend meetings or prepare documents to inform others of the Navy's activities. Dr. Lesnick noted that such a pattern of relative disinterest in a topic after completing a report is normal in the dialogue process. However, in this case, the required 3 year status report to Congress and related hearings has kept the issue from dropping completely off of people's agendas.

As a part of the Keystone Center's efforts to determine what the next steps should be for this dialogue, in February, a caucus meeting of the environmental community was held. At that meeting, the full range of options from backing out of the process altogether to revitalizing discussions was considered. The caucus group concluded that they had a mutual obligation and committment to the process.

Nancy Stehle held a similar meeting with the Navy personnel involved. They discussed the current status of Navy efforts and if and how new people should be integrated into the dialogue.

Based on those meetings, it was decided to hold this plenary session. The intent was to meet in previously assigned work groups part of the day to review Navy efforts and then in a large group to determine next steps.

However, Dr. Lesnick noted, the plans for this meeting were changed during the prior week. The changes were triggered by a letter from Sally Lentz to Nancy Stehle which identified questions about a few operations recommendations from the first report. Nancy Stehle sent a copy of the letter out to the appropriate Navy personnel. Within the Navy, the letter generated much concern. Apparently there were some misunderstandings about the intent of the letter.

To determine what Sally Lentz's intent had been, she and Craig Alig met. Craig brought Sally up to date on the Navy's efforts. Although it had not been reflected in the documents prepared by the Navy, much has been done to meet the first report's recommendations. Sally Lentz commented that she wrote the letter in good faith and as an effort to protect the process.

As a result of this discussion, all sides seemed willing and anxious to meet. However, it seemed prudent to rearrange the agenda for the May 11, 1990 meeting. It seemed important for everyone to have an opportunity to understand the strategic direction the Navy was heading and to get the big picture rather than going into work groups. The new agenda for the shortened meeting had Craig Alig and others presenting the group with an up date on the Navy's activities. Then given that information, the group would decide where it wants to go with this effort.

Dr. Lesnick noted that attendance at this meeting was restricted to those who had participated previously or where there had been one-for-one replacements for previous participants. He felt it was important to start with those who have an investment in the process and then determine if additional individuals should be added.

Craig Alig began the presentations by stating that he thought the previous effort had been successful because the group had met frequently and as a committee of whole. Breaking into work groups results in four separate interest groups rather than a cohesive whole. Communication is reduced as a result. He suggested that future efforts should return to the committee of the whole approach. Alig then reviewed the agenda and explained that CDR Rick Vizzier (CINCLANTFLT) would present the current status of Operations, Linda May (NAVSUP) would present the current status of Supply, Leslie Middleton (DTRC) would present the current status of efforts on the USS Lexington Zero Plastics Discharge Demonstration and Plastic Waste Recycling, and Tom Scarano

(NAVSEA) would present the current status of System's Acquisitions. He would present the current status of Technology.

OPERATIONS

Rick Vizzier began by reminding participants of the context in which the Navy is making changes. He noted that on ships one is dealing with a complete personnel turnover approximately every three years and a staff that is, on average, 20 years old. As a result, training is a very important point for influencing behavior. Thus, the fleet staff responsible for Navy plastics compliance have begun their efforts by briefing the commanding officers and executive officers, and the senior officers on the ships about environmental compliance requirements. CINCLANTFLT staff feel it is important to get the top personnel on board if one is going to get compliance from the line staff. Second, CINCLANTFLT staff are trying to identify what is currently being done by Navy personnel across the fleet and then communicate it to others within the service. Once again, they are trying to diffuse the information through training opportunities. For example, CINCLANTFLT staff are teaching food service staff good practices to follow which will facilitate the handling of plastic. In the food service area, rinsing out milk jugs will reduce the food contamination. Similarly at supply corps school, the curriculum is being changed to reflect the concerns about plastic disposal. Additionally, the lessons learned from the demonstration ships are being passed along at these training sessions.

Vizzier stated that he feels that training is key to keeping the program alive. Secondly, public affairs is critical. Fleet staff have been making a concerted effort to keep plastics disposal and reduction activities visible in the Navy's internal press. (See attached articles.)

Additionally, Vizzier has prepared a draft environmental instruction which codifies the plastics recommendations from the first report. An instruction is like a regulation; it is in effect until it is retracted. If it is violated, a penalty can be assessed. The instruction is still in draft form because it contains more than just plastics. It also addresses Clean Air Act, Clean Water Act, RCRA, etc. and how they are applied to Navy ships.

To reinforce the importance of doing something about plastics, the Navy has instituted several different activities which will raise its visibility to its staff. First, the annual command inspections will now look at plastic compliance. Second, the Ney Award for the best meals served aboard ship will now consider plastics disposal as a factor. It is a very prestigious award and is given to only 6 out of 500 ships. Similarly, the Sales and Services Award which goes to shipboard stores, barber shops

and others will now consider plastics compliance.

Vizzier concluded by saying that he is receiving numerous complaints from ships about plastics compliance. From his perspective, that gives him a clue that the ships are at least trying to comply. He then observed that the Navy's problems with compliance stem from problems in execution not lack of desire to comply.

An example was presented to illustrate the magnitude of the problem each ship faces. In general a ship is out, actually steaming, 29 days out of a quarter. The USS America generated 11,200 cubic feet of plastic on its trip from Spain to Norfolk. During that period, the plastics had to be retained according to the 3-20 rule. (i.e. food contaminated plastics had to be held for at least three days before being released overboard, while non-food contaminated plastics had to be retained for twenty days.)

Vizzier then responded to questions raised by dialogue participants. One participant asked "How did the Navy decide what to do after the first report was released?" Rick Vizzier indicated that the Navy decided to go with a demonstration ship approach. Seven ships were selected to undertake proposed changes to clarify what might work. This is a different approach than that usually adopted by the Navy.

Second, dialogue participants wanted a clearer understanding of why an environmental instruction will be issued by the Navy. Vizzier responded that they had gone with an instruction because messages just get buried and have to revalidated each year. There is currently a 3-20 message on plastics disposal. It is dictating the procedures being followed today. It states that:

> 1) 3 day rule -for food contaminated plastic there is no dumping for at least three days,
> 2)if the trash is becoming a health hazard, it can be dumped but it must be weighted so that it will sink to the bottom,
> 3) 20 day rule - for non-contaminated plastics, if not off-loaded in that time, they can than dump it overboard, but it must be weighted.

At any time if they cannot comply due to health concerns, the plastics can be dumped, but the action must be reported. Disposal of plastics is to be reported in the ships log. The loophole is that health and safety of the crew comes first. Currently, CINCLANTFLT is averaging about two calls a month where the ship cannot comply with the 3-20 rule.

An instruction states policy. Once issued, they remain in effect until they are revoked. There are penalties associated with non-compliance with an instruction.

The third question inquired about the creation of an environmental officer on each ship which was one of the recommendations from the first report. What has been done? In response, it was noted that on most ships a new staff position had not been created, instead someone has been assigned that responsibility on each ship. A Naval occupational health and safety officer will only be found on the largest ships, responsible for public health, but someone will have that function on all ships.

Rick Vizzier pointed out that there apparently is a sub culture is forming among those responsible for plastics compliance on board ships. Some of the officers responsible for plastics compliance are now wearing green vests when they are preforming those activities.

Someone then queried about the status of efforts in the Pacific Fleet. It was noted that the Pacific Fleet's efforts are mirroring the Atlantic Fleet, but, they are behind by about three months. It appears that they are watching what the Atlantic Fleet is doing and learning from their experiences.

As an aside, personnel changes within the Navy should bode well for continued support of the Navy's efforts to comply with plastics requirements. Admiral Kelso (who spearheaded CINCLANTFLT's early committment) is the new Chief of Naval Operations. Admiral Miller is new CINCLANTFLT Deputy Commander of Naval Supplys.

SUPPLY

Linda May began her presentation by noting that initially, the supply area had not been funded. Starting with FY 1990, the Plastics Removal in Marine Environments Office (PRIME) has been fully funded with five staff. Full funding has been allocated through FY 1994.

The first area of concern to the PRIME staff is the generation of plastic which is food-related. Fifty-five percent of the plastic generated on board ship is food contaminated. To reduce that amount, the NADICK labs in Massachusetts are currently conducting research and development efforts to find substitutes for milk bladders, cottage cheese containers, etc. They are also looking for a means to sanitize food contaminated plastics.

As a part of PRIME's effort to get a sense of what is happening on board ships, the supply office has been collecting consumption data from the ships. They have found that many items are being purchased in small quantity packages. As a means of reducing plastic generated from packaging, the supply office is looking at the potential to buy items in bulk packages (e.g., 20 and 40

pound quantities). Many of the bulk items are available in non-plastic packaging. As they determine what is available, they will let the fleet know and will change ordering.

The PRIME staff are also currently testing an ethylene absorber for fresh fruit and vegetables which would be hung inside the refrigerators. If it works, there would no longer be a need to wrap fruit and vegetables in plastic to keep them fresh.

May was asked if the general public concern about plastics in packaging was helping the Navy? Yes, but very slowly. One area of change which has been quite helpful is the move towards concentrates.

The PRIME staff has surveyed the supply centers to find out what each is doing individually to come up with non-plastic alternatives. A list has been compiled and is the resulting infomation is being shared with other supply centers.

On a different level, many of the Navy's forms are sent out wrapped in plastic. The PRIME staff are looking into alternatives, however, the cost differential of some options is quite a deterrent. To use paper wrap would cost 85% more plus the cost of the machine to wrap the forms. Another option being considered is use of computers. (This option would only work when ships are in port and can be connected with telephone lines.) In one scenario, the orders would be sent over modems. In another scenaric, the forms could be put on floppy disk and run off as needed.

In their efforts to minimize plastics, the supply staff are monitoring the efforts on the USS Lexington and coordinating them through the Pensacola supply center. Materials come through the center and excess plastic is removed. There are three areas where plastic is still needed: static barrier, moisture barrier protection, and fire retardant. However, alternative packaging means are being sought.

The current supply specifications are being reviewed to minimize plastics. The inventory control points, warehouses and supply orders are being informed of the need to reduce plastics. As an example, clothing is currently packed in plastic. The new specifications require non-plastic packaging. For example:

-The PRIME staff are comparing the cost of waxed cardboard versus shrink wrap.

-The PRIME staff are also looking into the use of edible plastic for wrapping meat. It includes the seasoning and is used in the cooking process.

PRIME staff are also trying to determine what is appropriate packaging and what is excessive. May distributed a matrix which illustrates what changes have been initiated which will reduce

the amount of plastic entering the waste stream.

PRIME staff are also instituting a system to determine which items include plastics. Supply center personnel are now calling PRIME staff and telling them about items where plastic may not be necessary. They are reviewing the entire stores inventory to determine what items contain unnecessary plastic. The PRIME staff is also working with the General Services Administration and the Defense Logistics Agency to change items available. The Navy needs to identify which products it is concerned about since those entities handle so many items. When PRIME staff identify substitutes which use less plastics, they are putting out advisories to the fleet identifying the substitutes.

Given their limited resources, the PRIME staff has been trying to determine which areas are not fruitful to pursue. They are uncertain what percentage of plastic will have to remain in the waste stream. They would like to minimize it since plastic storage on board ship is a big concern because of the fire potential.

The PRIME staff is currently making a concerted effort to inform other government and non-government entities of their efforts and results to reduce plastic in the supply stream. They will be making a presentation at the next Joint Logistics Command to all services to convince them to reduce plastic usage. They will also be briefing the American Logistics Association (the packaging industry) about their concerns in June.

TECHNOLOGY

Craig Alig brought the dialogue participants up to date on the Navy's efforts to develop new technologies to handle the waste stream on board ship. There are three areas where the Navy is focusing its efforts: trash compactor, solid waste pulper, and thermal destruction technology. A fourth technology, thermal destruction technology, is an ultimate goal, but currently little work is being done in that area.

Taking each in turn, to date, the Navy has developed a trash compactor which has been tested on board ship for one year. During that period, it processed 46,400 pounds of trash and garbage. Of that, 3,400 pounds was plastic waste. The compactor produced 1520 plugs and was in operation for 365 hours or approximately 3 hours per day. With the shipboard test behind them, they are preparing documents for acquisition of such machines.

The second technology is the solid waste pulper. It is essentially a big garbage disposal. It will handle 60-70% of the waste stream. It will not process plastic, water, metal, or cloth. They have a prototype machine which began tests in May

1990 at the David Taylor Research Lab. The current machine can process 2000 pounds per hour. It will replace incinerators on board ship. The ship crews are pleased because with the solid waste pulper, they will be able to run it during flight operations. It will discharge slurry which does not affect visibility unlike the incinerators. The program to develop the solid waste pulper has been accelerated 300 percent due to the interest of the Navy and others and available money. The Navy expects to have a non-prototype compactor on board ship in six months. There is a lot of demand from ships for the equipment.

The third technology is the plastic waste processor. The Navy's goal is to have zero discharge; a plastic waste processor would facilitate achievement of that goal. At the David Taylor Lab they have parallel in house development occurring. They are looking at different parameters of pressure, time and temperature. They will award multiple contracts to get different technologies tested.

A plastics waste processor is needed because of the amount of plastic generated on board ships. On big carriers, they produce 1100 pounds of plastic per day. Storage of that amount of plastic occupies 720 cubic feet of space. If the plastic is made into "fat frisbees" by a processor, it would only occupy 25 cubic feet of space. This would significantly reduce the amount of storage space needed to retain plastics. The plastic frisbees generated would meet USDA APHIS requirements. The Navy hopes to have such machines installed in some ships within five years and in all ships two years later.

The fourth technology which the Navy hopes to develop is thermal destruction technology. It would make the plastic waste virtually disappear. Only a small residue would remain. Little work has been done on this technology to date.

Craig Alig reminded the participants that storage of plastics is a problem. Ships have been individually deciding how to do it and where they will put the bagged waste. One new innovation which is facilitating these efforts is the development of odor free bags. The researchers are also looking at different alternatives to plastic - chitosan, and regenerated cellulose. They plan to chose one type and test it. The key criteria is the ability of the bag to be made commercially.

In all of these efforts, the U.S. government owns the technology developed. There has been alot of interest expressed in it by other countries. The U.S. Government will have to decide if it will sell these technologies to other countries or whether they will give it to them.

ACQUISITION

Tom Scarano described this portion of the Navy's efforts. The Navy is currently well funded in terms of research and development efforts and its ability to buy equipment and install it. They have been budgeted $400 million for hardware alone - to develop, buy and install it. $20-30 million is for Research and Development, $160 million is to buy hardware, $200-300 million is for installation. The budget process supporting Navy plastics compliance efforts is being fast tracked. Atypically, NAVSEA is doing all three things at once, purchasing hardware,installation and development. Currently, NAVSEA staff do not now where everything will go. Within the acquisition process, NAVSEA staff is shortening the process where they can. Installation is the hardest part. This can only be done when ships are scheduled to be in the shipyards for maintenance.

Development of the technologies is the key issue at the moment. The master installation schedule will be available at the end of the summer. In the interim until a special compactor can be developed for ships, NAVSEA has prepared a list of commercial compactors which ships can install.

RECYCLING

The U.S.S. Lexington has been selected as the primary demonstration ship for testing the complete plastics minimization system. It was selected for several reasons: 1) it is located in the Gulf of Mexico which will be n no discharge zone, 2) it is a training carrier and thus has a predictable schedule, 3) it has high visibility to those within the NAVY, and can be accessed easily. The intent is for the U.S.S. Lexington to be at zero discharge by the end of the summer.

In addition to minimizing plastic waste generated, the Navy is now turning its attention to the recycling of plastic. Saving all of the plastic aboard ship and then send it off to the landfill does not make sense. The waste returned to land is primarily packaging films and food contaminated plastics. This is not the kind of waste which is currently being recycled. The Navy is in a joint effort with industry to develop recycling processes which will deal specifically with this kind of waste. In the test program, the Navy will collect the waste pierside, bale it and then ship it to two different vendors. Products will be made out of the recycled plastic such as palettes and picnic tables. Additionally, the research staff is currently identifying items within the waste stream which may be worth something by themselves (e.g., canisters). A summary report about this summer's experience will be available by November 1990.

With the conclusion of the presentations, Dr. Lesnick stated that he and the other dialogue participants appreciated the Navy staff's willingness to present to us on such short notice.

Participants noted that the information presented was very exciting. The discussion then turned to an examination of next steps.

It was noted by Navy personnel that they do not know how long it will take to comply with the MARPOL treaty. Current efforts on the U.S.S. Lexington will help them get a better handle on how long it will take. From the Navy's perspective, the dialogue group can help the Navy decide where to strategically focus its efforts.

It was then suggested that an objective for next 6-9 months would be to prepare a report to be submitted by the dialogue participants to Congress when the Navy submits its three year report. As a part of that process, the dialogue participants could continue to monitor the process, testify at congressional hearings and follow up on first plastics report.

It was felt that the first report and its recommendations should be revisited after the U.S.S. Lexington report is released. The next meeting was scheduled for June 4 from 2-5 p.m. in Washington, D.C. Also, the group tentatively scheduled a session for July 23 , 2-5 p.m. in Washington, D.C. and a field trip to Pensacola to see the U.S.S. Lexington on July 30-31, 1990.

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NAVY PLASTICS DIALOGUE
June 4, 1990
Meeting Summary

Dr. Lesnick began the meeting by introducing a potential new participant, Andy Palmer, from the American Oceans Campaign. He noted that Mr. Palmer was attending to learn more about the dialogue and that his possible inclusion and that of others needed to be discussed by the entire group. Dr. Lesnick then noted that there were several purposes for the meeting. First, there was a need to further explore the issues identified at the May 11, 1990 meeting. Second, there was need for a discussion of how dialogue participants want to communicate the Navy's activities to date to their constituents and others. Third, the participants needed to talk about the two meetings scheduled for July. Fourth, the dialogue group needed to decide if there should be a second report.

The discussions began with Dr. Lesnick asking the participants if they still had unanswered questions about the status of Navy efforts on the first report's recommendations. In response, one of the participants wanted to know the status of the use of paper liners in waste receptacles. The Navy's response was that paper liners are now available for use but they are more expensive. Additionally, where the paper liners have been used, they have been found to leak since the paper is water resistant not waterproof. The Navy Supply staff have asked the ships who experience such problems to file complaints with the General Services Administration (GSA) so that the GSA will make changes in their specifications. The use of paper liners is being tried on the U.S.S. Lexington. That trial will give them a sense of how they actually work. However, as noted previously, they are currently available as an option.

As an additional point of information, the Navy personnel explained that any plastic bags currently in use are no longer opaque so that the contents can be seen. Thus, as trash is dumped over the ship's fantail, it can be determined that no plastic is contained in the bags. Additionally, the plastic bags are not being tossed over board. They are being stored.

The next question addressed the status of incineration efforts on board ships. Many ships, especially the large ships, have incinerators on board. The fleet has been considering the option of using incinerators to take care of plastics. As a part of that consideration, NAVSEA has initiated a survey of ships incinerators to determine their condition. The survey will recommend whether they should be used to burn plastics.

The survey of the incinerators is not looking into the toxicity of the emissions nor the ash since the Navy staff do not expect

the incinerators to be used for plastics. The Navy personnel feel that it is highly likely that the recommendation will be that the incinerators should not be used to burn plastics. The incinerators are dinosaurs - slow and inefficient. Their only real use is when ships are overseas somewhere. The survey is being done out of the Navy Ship Systems Engineering Station in Philadelphia. It is expected that the survey should be done by September and that the report can be made available to the dialogue participants.

Although the incinerators themselves may not be a part of the Navy's solution to the plastics problem, the space that the incinerators occupy will be useful. It is the Navy staff's hope that the incinerator room will ultimately be used for the plastic compactor, pulper and other new equipment that is being developed to handle the plastics. The Navy staff see the report as a means to put clout behind the order not to use the incinerators. Tom Scarano is responsible for the survey and should talk about it at the next meeting.

The next question posed was "when will the ships stop plastics disposal?" The Navy personnel responded that they will not know until the end of the summer after the trials on the U.S.S. Lexington. The goal of the U.S.S. Lexington demonstration is to achieve zero discharge of plastics.

To accomplish this goal on the U.S.S. Lexington, the Navy will try various techniques. These include refrigerating food contaminated plastics, odor barrier plastic bags, the plastic waste processor which will compact the plastics into "fat frisbees". They will also get a sense of how difficult it is to separate food and plastics.

For food related plastics which is approximately 50 percent of the plastic generated, the Navy will try several things to reduce the amount of plastic and the amount that is contaminated. The training guides for staff will identify tasks, such as rinsing out milk bladders, which will reduce the amount of plastic. They will test the use of pure wax paper for food and reusable food trays. During the test, Navy lab and NAVSUP personnel will be on board ship to monitor the changes and to see firsthand how they are functioning. They will also be testing the garbage grinders to see how high the failure rate is. One of the major sources of food contaminated waste is the failure of the garbage grinders. Their failure results in the food waste being stored in plastic bags.

The U.S.S. Lexington goes out for ten days at a time. If the changes are successful on board the U.S.S. Lexington, then the lessons will be extrapolated to longer periods at sea.

After the completion of the Lexington test, the Navy will

hopefully have a better sense of the answers to these questions: What will it take to go to zero discharge? How much technology and how much training? The Navy is also trying to identify interim technologies which can be used until the plastic processor can be put into place.

The discussion then shifted to the process for developing and installing the plastic processor on board ships. The participants also wondered if there was anything that Congress can do to accelerate the pace? In response, the Navy personnel said that it would require five years for shipboard installation and that there is little that Congress can do to help. They then went on to explain why it will take so long. The process has very few points where things can be accelerated. It takes 1 - 1 1/2 years to get bids and contracts awarded. If any bidders protest, an additional year of time is required to go through the necessary procedural requirements. It was noted that the way to avoid such problems is to visit all of the vendors and find out who is serious. Once the award is granted, the Navy is only limited by technology not administrative procedures. Once development is completed, the focus is then on the acquisition process.

On the plastics processor the Navy has awarded the contract to three contractors to guard against encountering a major setback in case one contractor is unable to develop the technology successfully. The contract procedure has several distinct phases. Phase 1 is the engineering feasibility study level 1 drawings. This takes about 4-6 months. Phase 2 is the engineering development models. This is where a prototype is built and tested in the lab. This normally takes approximately a year. Level 2 is the drafting of the blueprints of the model. From them, a pre-production prototype (PPP1) is built. At that point the product looks quite similar to what will go on board a ship. Once the pre-production prototype is built, the labs can conduct safety analyses, prepare parts support documents, and write technical and training manuals. At best, it takes one year to get PPP1 on board a ship. The technology is then tested on-board ship for at least six months. It takes longer than that to complete the test as there is installation and staff training time required. Once the shipboard test is completed, the prototype is put through a series of destructive tests such as vibration and shock and hitting it with a four ton wrecking ball. Historically, the same prototype is used for both the test on board ship and the destructive tests. This is the norm because it is too expensive to build two prototypes. However, for the plastics program, the Navy is building two prototypes to reduce the time needed.

Once a model has been through all of these stages, the Navy has to advertise for bids for production. This process takes one to two years. To reduce that they are going to proceed with a

limited procurement of 8-9 units. By seeking fewer units, they do not have to go through as many administrative procedures.

Given all of these requirements, at best, the Navy can get a plastics processor on board ship in five years. They have outlined a process which will take four years for the design and testing phases and one year to get the processor on board ship.

A key element in the Navy's plastics program is the plastics processor. It is the most efficient and effective means to dispose of plastics. The Navy will allocate the plastic processors when completed to the ships which need the technology the most. Several criteria were identified which will be used to determine which ships receive the plastic processors first. First, aircraft carriers will receive first priority. Second, the newest and largest ships will receive high priority. Old ships which have a limited life remaining will be low priority. Newly purchased ships will come with compactors which will reduce the need for a plastics processor.

The Navy staff feel it will take until the year 2000 before all commissioned ships have processors, compactors and pulpers. For some of the older ships, it may make more sense to use odor barrier bags as the primary means of achieving zero discharge of plastics.

Since the exact information about how long it will really take the Navy to reach zero discharge will not be available until the end of the summer, the question was posed about what the group should do in the interim. Additionally, the question was raised about what level of performance will be perceived as a good faith effort that will be acceptable to the environmental community and to Congress?

Navy personnel noted that currently the Navy is at 70 percent reduction in plastic discharge. This is 70 percent from what was being generated previous to these efforts. There are three factors which must be considered - cost, impact and ease of effort.

The group then revisited the information supply changes presented by the Navy at the May 11, 1990 meeting. As noted previously the NAVSUP staff have been making a concerted effort to reduce plastic packaging. They have been trying to let the plastic industry know of their concerns. Since the last meeting, the Navy is now a member of the food packaging industry working committee to permanently reduce plastics. They are also talking to the plastics trade association. THe PRIME staff is also trying to work with the General Services Administration and the Defense Logistics Agency to get them to change packaging specifications. From recent discussions, it appears that the Army will support the Navy in these efforts. The Coast Guard has

not signed on to these efforts yet but the new commandant should be supportive. It was noted that the publics demand for decreased plastic in packaging should help the Navy in achieving its goal of reduced plastic in packaging.

At the conclusion of the discussion about supply issues, other dialogue participants encouraged the Navy to work with state and local agencies and environmental groups to push for reduced plastics in packaging.

The direction of the discussion then shifted. Dr. Lesnick suggested that participants step back and think about what should be done next. Given what we now know, should there be a second report from the dialogue group? If so, what should it contain? Is a second report what this group wants to do.?

At the caucus of the environmental groups, there was a consensus that the group had an obligation to do a follow-up. It was observed that such a document would be useful for the congressional staff. The release of the second report could be timed to occur at the same time the Navy's three year report is sent to Congress. However, these would be two different documents. The participants thought that it would also be useful for oversight hearings.

One suggestion was for the dialogue participants to examine the original report and address the status of each recommendation and explain what has happened. If the first report's recommendations were way off, it was suggested that the report prepared should note just that. Additionally, the group needs to address the three year report issues within whatever report is produced.

It was also suggested that based on the U.S.S. Lexington study, the Navy should try to put together a draft of the three year report. That would enable the group to review and critique it. By doing that early, it would give the Navy time to generate new information if it is needed.

The group decided that they would review the first report's recommendations. To assist that effort, by July 23, a recent academy graduate in Craig Alig's office will prepare a written update of the status of Navy efforts. To prepare the report, she will meet with the chairman of each of the subcommittees and as many other participants in the group as possible. The report will include photos, graphs, etc. It will describe the status as of June 1, 1990. Hopefully, the report will be concluded several days early so that it can be mailed out to dialogue participants for their review prior to the meeting.

Dr. Lesnick then asked the participants to think about the pros and cons of visiting the U.S.S. Lexington. The participants referred back to their previous trip to the U.S.S. Forrestal.

They felt the visit gave them a feeling of what they are trying to impact. They felt that this trip would have a similar effect. They also thought that the trip would give them an opportunity to float ideas past those who will have to live with them. There is also a lot of interest in seeing firsthand the Navy's efforts to date. While on the trip they would also visit the supply center and would see the changes which have been made on that side of the equation. The group then concluded that the trip would be worthwhile. The dates previously selected, July 30 and 31 were kept as the dates of the trip. The specifics would be determined and participants informed.

The discussion then shifted to focus on the question of whether new members should be added to the dialogue. The group concluded that additional congressional staff and environmentalist would be helpful if the appropriate individuals could be identified. Andy Palmer was welcomed to join. Additionally, someone would talk with Christina Gjerde of Greenpeace and Bob Eisenbud to invite them to participate.

Addressing other agenda items which had not been discussed, it was announced that Navy personnel were putting together information for the dialogue participants to use to write articles to spread the good news about the Navy's efforts. A packet should be available by the next meeting..

Additionally to provide some background information to the participants, a copy of the 3-20 environmental message was distributed to dialogue participants so that they could see the specifics which are guiding current Navy activities relating to disposal of plastics. (A copy is attached.)

The next meeting is scheduled for July 23, 1990 in Washington D.C.

MEETING SUMMARY
KEYSTONE DIALOGUE ON NAVY PLASTICS
JULY 23, 1990

Martha Tableman began the meeting. She announced that Dr. Lesnick was delayed facilitating the DOD Hazardous Waste Dialogue group but would arrive as soon as possible. Agendas and travel plans for the Pensacola, Florida trip were distributed. Because there were a number of new people present, introductions were done. It was stated that the meeting had a very simple agenda. It would begin with a brief update on the Navy's activities by Craig Alig. We would then receive a briefing on activities currently underway on the U.S.S. Lexington by the ship's supply officer, Rick Arllen.

Craig Alig introduced Ensign Mercer who is preparing an update on the initiatives contained in the Dialogue's first report. She will be determining the status of the Navy's efforts on each initiative. Ensign Mercer indicated that she is encountering problems with her analysis because of the overlap between issues. To assist her in this effort, a sign-up sheet was passed around. Those dialogue participants interested in a particular area were to sign up and Ensign Mercer will contact them for additional information on that specific initiative.

Commander Rick Arllen provided an overview on the Navy's efforts onboard the U.S.S. Lexington. (For an outline of his talk, see attached handout provided by CDR Arllen at the meeting.) He reminded the group that the U.S.S. Lexington is the primary demonstration ship for the Navy's efforts to eliminate the disposal of plastics at sea. He outlined several reasons why the U.S.S. Lexington was selected for demonstrating an integrated approach to waste management. One, it is a limited aircraft carrier. Only certain planes can land on it. Second, it operates in the Gulf of Mexico. Third, it has a published schedule of operation, thus tests can be performed on it easily. Finally, it has lots of space for experimental machines.

The fleet has seven demonstration ships which are trying various ways to reduce their plastics. The lessons learned on those ships are all being put together on the U.S.S. Lexington.

As he began, he focused on the organizational aspects of their effort. In terms of personnel working on the plastics effort, he has one officer who's full-time responsibility is plastics. She has ten people working on plastics full-time under her. Additionally there are 30-40 people who work part-time on plastics. These are people who manage other people and now bring an awareness of plastics into their discussions of how work should be done. Commander Arllen indicated that the commanding officer of the ship, CDR C. Flack Logan, is a strong proponent of the PRIME program and pushes the PRIME program without much prodding from the plastics staff.

The program onboard the U.S.S. Lexington is an integrated program; all aspects of waste management are addressed. Aluminum cans onboard ship are collected and recycled. The resulting money goes back to the crew for their recreation program. Also onboard they have a solid waste processor which is nicknamed "the goat" because it will grind up almost anything. It is used to process non-metal and non-plastic waste.

The program onboard the U.S.S. Lexington is outlined within the LEXINST.95931, a written instruction which:

- defines plastic,
- establishes a policy for segregating plastics
- establishes a procedure for disposing of plastic while at sea
- identifies the individual responsible for the plastics program onboard, Plastic Waste Control Coordinator,
- identifies the Plastic Control Petty Officers (enlisted personnel, mid grade) who ensure compliance throughout the ship,
- outlines the process for compliance with 20/3 rule,

Since the instruction was issued, the U.S.S. Lexington has not had to dispose of non-food contaminated plastics while at sea. Efforts are being made to minimize the amount of food contaminated waste generated.

To ensure compliance and address problems as they arise, the petty officers meet with the Plastics Control Officer at least once a week. Similarly, at department head meetings, the supply officer's counterparts, plastics management is brought up.

The ship's TV and radio stations include commercials about the importance of proper plastics disposal. To educate the sailors about plastics, the Navy has developed a video using a Huey Lewis song. It is played on the ship's television station. They have also instituted a poster contest addressing the issues of plastics reduction. The criteria for selection is originality and the message. Those who win will receive additional leave time.

Arllen indicated that the ship's staff attempts to off-load any plastic possible before leaving port. Food contaminated plastic which must be handled separately is stored in a special room. To date, Arllen noted that they have been able to retain food contaminated plastics for 6 days while at sea. The limiting factor is quality of life onboard ship. The primary problem is smell/odor. The clean plastic, non-food contaminated, is stored in divisional spaces while at sea. Under the 20/3 rule, they are

required to keep the clean plastic for 20 days. Thus, he noted that it is kept onboard for the complete operating cycle which is 10 days - 2 weeks.

Arllen then focused on the machinery onboard which is intended to facilitate plastic separation and retention. Storage space is a limiting factor. Thus, the U.S.S. Lexington has 3 compactors installed onboard ship. One is 6 cubic feet, the second is 4 cubic feet, and the third is 2 cubic feet. The compactors make slugs i.e. square bales out of the waste plastic. These slugs occupy less space allowing the storage of additional plastic. The ship's personnel have determined that one of the compactors, the smallest, is not powerful enough to handle plastics efficiently. So, instead, it is used to compact the aluminum cans. Management of aluminum cans is a concern. The ship goes through 8-10 pallets of canned soda per 10-14 days.

The odor-barrier bags will be tested in August. However, there appears to be a problem of anaerobic decomposition with the bags. The David Taylor Research Center staff is trying to identify something which could be put into the bag to slow decomposition. Anaerobic decomposition is of concern because it can lead to potentially serious health problems.

Arllen noted that the tests upon the U.S.S. Lexington have not been inexpensive. To date, it has cost $18,000-$25,000 to paint and label trash cans for the U.S.S. Lexington. Additionally, $114 million is being spent to test machinery on the U.S.S. Lexington plus the personnel costs of those involved.

CDR Arllen then identified the aspects which make the U.S.S. Lexington unique and thus constrain the applicability of lessons learned. It is a 47 year old aircraft carrier. She has been modified extensively for training purposes. She weighs 40,000 tons which is quite small. New carriers weigh 80,000 tons. She is 910 feet long . New carriers are 1,100 feet long. Her crew is 1400 instead of the 3,500 she was initially built for. As a result, there is a significant amount of extra space for plastics storage and less plastic generated.

After the presentation, Dr. Lesnick asked if there were any specific questions that those unable to go on the trip wanted answered. The following questions were raised:

-What is being done about DOD hazardous waste?, and how is linked with the plastics program?

-How does the Lexington experience extrapolate to other ships?

-What are the ways to minimize food contaminated plastics?

In closing, it was noted that the U.S.S. Lexington report on the PRIME experiment will probably be ready on Dec 1, 1990.

Additionally, it was noted that the update on the first report will be ready for the next dialogue meeting on October 29, 1990 from 2:00-5:00 p.m. The location will be determined at a later time. At that time we should be able to receive the verbal results of the efforts onboard the U.S.S. Lexington in August.

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SUMMARY OF DISCUSSION ONBOARD
U.S. LEXINGTON AFTER TOUR
July 30, 1990

At the completion of the ship tour, all tour participants and the U.S.S. Lexington staff met in the officer's dining room to discuss what they had seen. Dr. Lesnick began the discussion by asking participants to focus their discussion on the following aspects of what they had seen:

What seemed to be working.
What was not working.
What future actions were needed.

He reminded those not in the dialogue group that the level of interest in the U.S.S. Lexington was particularly high because of the upcoming 3 year report by the Navy to the Congress. He noted that for many of the non-Navy participants, there was a strong desire to learn about all of the actions undertaken to date, as well as the viability, timing and cost of any other actions that might enable the Navy to comply with the 5-year provision. If it appears that the Navy might not be able to meet the 5-year deadline, the non-Navy participants want to be very clear about why and the actions needed to proceed as expeditiously as possible.

To set the tone for open, frank discussion, the participants were encouraged to speak freely and were reminded that the Navy wanted to hear an honest assessment of the activities underway.

The discussions began with the visiting Navy personnel making their observations about the activities onboard the U.S.S. Lexington and the PRIME program in general. They noted that initially some Navy personnel had been concerned that the amount of plastic generated onboard ship would be too much for them to retain. However, the experience has been that if non-food contaminated plastic is retained within individual work areas, it is not a problem. Education of the sailors has been very successful in terms of handling non-food contaminated plastics. The remaining problem is how to safely handle food contaminated plastics.

Another individual from the Navy observed that from a Navy perspective broader than a single ship, the fleet point of view, the Navy is concerned about the amount of money it will take to comply. They see the constraints on the program being how much effort you can expect from an individual sailor and the amount of money available to purchase equipment and other needs associated with the PRIME program.

Additionally, that individual then observed that Navy efforts

onboard ships must consider the safety of those onboard as well as the implications for other aspects of the waste stream. Currently, the fleet is very concerned about the disposal of hazardous wastes overseas. Disposal has been occurring either in the ocean or on foreign soils. In the future, the Navy will have to bring the waste back to the United States.

Continuing, it was noted that awareness of these waste management issues has increased and is present through the highest levels of the Navy. The Navy Program Objective Memorandum (POM), the budget target, for this year includes $356 million for environmental compliance. It is the only item within the Navy budget which received an increase.

The Navy staff told the tour participants that they, the Navy, need help in addressing management of the entire waste stream. As a place to start, a uniform labeling system for hazardous materials would be helpful. Towards that end, it was noted that NAVSUP is currently in the process of developing a system which will be clearer to the sailors.

The visiting Navy personnel feel that the Navy can deal with the plastics problem although they believe that the Navy will not be in compliance by 1993. They suggested that a change in the law which will allow them to keep dumping some plastics will be necessary since the Navy will not be able to meet the deadline. Storage capacity onboard ships was identified as the primary problem. The Navy's ships will need better compactors and other machines to handle the plastic.

Dialogue participants were reminded once again that the U.S.S. Lexington is not representative of a normal carrier. It was also observed that small ships will have unique problems because they have less space to work with. To complicate the extrapolation of the experience onboard the U.S.S. Lexington is complicated, it has significantly less staff which allows it to devote more space to plastic storage.

The dialogue participants were also reminded that the plastics program is happening on all carriers. The difference between them and the U.S.S. Lexington is that the other ships do not have the special machines such as the food pulper and the plastic processor. They do, however, have compactors.

Returning the discussion to a more specific focus on the experience on the U.S.S. Lexington, one of the visiting Navy personnel observed that as a critical aspect of their effort, the Navy will need to have Navy-wide training on the environment for its personnel. It was observed by those who have been working with the U.S.S. Lexington to implement the changes that increasing the awareness and education of the sailors has been slow and frustrating. Their efforts have taken a significant

amount of extra labor and effort. However, with the U.S.S. Lexington, the Navy has now succeeded in demonstrating the importance of handling the solid waste stream onboard its ships.

The Navy personnel observed that the start up and success of the plastics program comes down to education of the sailors. Once the Navy has been able to get staff to believe in and understand the importance of the retaining and reducing plastics, it has become easier to get compliance.

Having heard from the visiting Navy personnel, Dr. Lesnick then asked the non-Navy dialogue participants, "What looked good to you as you toured the supply center and the ship?"

One non-Navy participant noted that they were surprised to see the high morale of the staff who work in the trash and garbage room. They pointed out that one of the Navy staff told them "he feels they have the easiest job on the ship." It was then observed that the widespread awareness of the ship's personnel about the need to address the plastics problem is encouraging and positive.

Similarly, the non-Navy participants felt that the education program onboard ship is well done. However, the education program needs to be documented and set up as a curriculum so it can be transferred to the other ships. They suggested that the problem now for those involved in the plastics program onboard the U.S.S. Lexington is how to maintain the high energy level around this program.

The non-Navy dialogue participants thought that the activities being employed to reduce plastic at the supply center were quite impressive. The supply center has done a tremendous amount to reduce the amount of plastic. However, the non-Navy dialogue participants would like to see plastic usage reduced at all Navy bases not just on items headed to ships. It was noted that shrink wrap is still being used on pallets going to places other than the U.S.S. Lexington. It was suggested that to truly be successful, the Navy will need to get manufacturers and suppliers to reduce the amount of plastic used so that less plastic enters the supply center.

It was observed by the non-Navy dialogue participants that the Navy has made significant progress. The Navy is clearly doing things now which three years ago they told the dialogue group that they could not do. It is the non-Navy participants' perception that the remaining problems are the result of the overall supply system and the need for education of individuals. In the supply arena, it was observed that the existing efforts have been significant and future changes are being explored. But, there was a feeling that the Navy does need to address the use of excessive plastic such as shrink wrap. In the education

arena, the non-Navy dialogue participants asked the Navy personnel "How is the education effort being handled?" " How can it be transferred to other ships?"

The Navy personnel responded that the education process needs to start with individuals. They observed that the Navy is no different than society as a whole. In general, our society is not reducing the amount of plastic it is using. However, the Navy is trying to change the attitudes of its personnel through its school system.

As one aspect of the Navy's education effort, it was noted that the Navy is developing a new video to use to educate its personnel. To help them in this effort, the Navy personnel noted that they would appreciate any materials or ideas the other participants can suggest. Larry Koss made the request; those with ideas or suggestions should contact him.

The non-Navy dialogue participants responded to the request for information by stating that the Navy is the precedent setter in the area of plastics. They suggested that what needs to be done is for the news of the what the Navy is doing to be put out to the public through the various media.

With those thoughts expressed, Dr. Lesnick asked participants to identify areas of concern. He noted that the dialogue is currently at a critical stage. The Navy's three year report to Congress is due in one year. If the Navy says it cannot comply, questions will be asked of those non-Navy participants in the dialogue, particularly the environmentalists. Those on the Hill will want to know environmentalists' perceptions.

As noted by the Navy personnel in the beginning of the discussion, the non-Navy participants observed that the remaining problem seems to be how to deal with food contaminated plastics. It is clear that the technology needs to be developed. Although they are aware that the David Taylor Research Center is currently working on this problem, some of the non-Navy participants were wondering if there is any way to accelerate the development process? The response from the Navy is that development is currently occurring on as fast a track as possible. There are a multitude of administrative/legal requirements which cannot be avoided.

Everyone seemed to agree that food contaminated waste is a major problem. It was noted that the compactor allows the food contaminated waste to be retained longer since it occupies less space. It was suggested by the non-Navy dialogue participants that other actions such as washing plastics to reduce odor could be explored. Similarly, it was suggested that the purchase of a freezer to store food contaminated wastes would eliminate the odor problems and may provide a temporary answer to the storage

problem until the plastic waste processor is developed and installed. Similarly, the use of ethylene blankets in the refrigerated areas would extend the life of vegetables without the use of plastics, thus, reducing the amount of food contaminated plastics.

It was observed that any efforts to reduce food contaminated plastics will be helpful. The Navy was encouraged to institutionalize the activities which are successful by integrating them into their training programs such as officer candidate school.

While much of the Navy's current problems with handling plastic arise from the limited space for storage onboard existing ships, a non-Navy dialogue participant asked if there have been efforts to change the designs of the ships so that new ships will have adequate plastics storage? The answer from the Navy was "Yes." The new ships are being designed with room to contain the plastic waste processor and other machines which will facilitate plastic handling and storage.

A non-Navy dialogue participant observed that everyone in the dialogue seems to have bought into the goal of keeping plastics out of the marine environment. However, it was pointed out that the environmentalists in the dialogue have another goal - to change the DOD and GSA procurement efforts as a means to change the way the country does business. This participant hoped that the Navy's efforts would facilitate this desired change in the other arenas. The Navy staff responded that they are trying to influence the rest of DOD and GSA as it will make their job easier. The first step is through the Joint Operating Committee. The Committee will look at making specification changes where possible on items to reduce the amount of plastics being purchased through the GSA and DLA procurement processes.

As the discussion began to conclude, the non-Navy participants expressed concern about the lack of congressional staff participation in the trip. They stated a strong need to get the congressional staffers to visit the U.S.S. Lexington and/or other Navy ships to see what is being done to address the marine plastic problem.

Dr. Lesnick thanked everyone for their time. He specifically thanked the Navy for providing the dialogue participants with an opportunity to meet with Navy staff who are dealing with the plastics problem on a day-to-day basis.

PRESENTATION PENSACOLA SUPPLY CENTER
July 30, 1990

Commander Gee began our visit with a presentation explaining their efforts to reduce plastic. He then guided us on a tour of the facilities.

In his presentation, Commander Gee began by noting that Pensacola is the Navy's newest supply center. It was established in 1985. It provides supplies to units worldwide. It works closely with the Naval Aviation Department (NAVDEP). NAVDEP provides repairs for helicopter components.

For most supply centers, the biggest source of orders is the fleet. This is not true for Pensacola. (See attached handout for a detailed breakdown of Pensacola's orders.) There are several different kinds of tasks which occur at the Supply Center. First, they have a warehouse where one item is filled per requisition. They currently have a paperless process; the orders are done through the computer system. Previously, small plastic bags were used to bag items. Now small paper bags are used. Their staff is also identifying items within the inventory which are candidates for paper packaging. For example, paper bags come in two types of packaging- packaged within plastic shrink wrap and in brown paper. The use of plastic is not necessary.

The second type of service is the SERVMART which is like a self-serve office supply store. In the SERVMART, they have done several things to reduce the amount of plastic. They have removed plastic overwrap, placed prominent signs to remind customers to eliminate plastic going to the ship, have large receptacles for disposing of unnecessary plastic and are using paper carry out bags. CDR Gee observed that customer education is vital for this to work.

Third, there is a customer service department which is for walk-through requisitions. This process is used when the customer cannot wait the several days for a item through the normal requisition process. As with the warehouse operation, minimal plastic is used in filling customer service department orders.

The Pensacola Supply Center does procurement for the southeast part of the country - from Texas to Panama City, Florida. They are working with NAVSUP to develop a standard contract clause for materials destined for shipboard use which calls for the elimination of plastic where possible. They are including a statement of work for a purchase that says that plastic overwrap is not needed. At the local business fair, they are informing local businesses of the PRIME concerns. Additionally, they are compiling a list of locally procured items that can have plastics

removed. It is important that suppliers get onboard and think about plastics reduction.

Pensacola does a significant amount of packing of parts repaired by NAVDEP. In their packing efforts, they have made strides to reduce plastic usage. Clients are informed to return plastic packaging materials for re-use. They are still using bubble wrap because they have been unable to find an adequate substitute. They use jiffy packs (padded envelopes) to ship many items. Styrofoam pellets have been outlawed. They are currently using paper document holders, paper bags, to hold invoices for items going to the ship instead of the clear plastic invoice holders. They are still looking for other alternatives since the invoice is not visible through the paper bag. Commander Gee feels that the Navy needs to go completely paperless in terms of requisitions and forms. In this area they have made progress, but opportunities remain.

To reduce plastic, shipping services has gone back to using metal banding instead of plastic banding. They are looking at the use of reusable tri-walls. (Big boxes with three sides that are reusable two or three times.) They are testing a new type that has recycled plastic tops and bottoms and the cardboard sides collapse flat. That capability will allow the ship supply officer to store the tri-walls onboard ship.

Similarly, the Navy is conducting a test with Lock n' Pop adhesive which allows the supply center to put together pallets without the use of shrink wrap. They are also removing plastic overwraps on any items headed for the U.S.S. Lexington. Both efforts reduce the amount of plastic which ends up onboard the ship.

The supply center with assistance from NAVSUP in Washington, D.C. is also looking into substitute items which do not use plastic. e.g. paper cups for coffee, paper wipes, cloth aprons, etc. Where possible such items are being sent to the U.S.S. Lexington.

In concluding his presentation, CDR Gee noted that customer education is a critical component of a successful program at the supply center. Not only does his staff need to be trained to look for areas where plastic can be eliminated but all employees who requisition items from the supply center need to be trained.

The supply center has a PRIME Committee with a representative from each of its function areas. It is a forum for ideas to be discussed and problems identified. To encourage communication, the supply center has established a PRIME line for people to call in ideas.

Upon completion of his presentation, the dialogue participants were taken on a tour of the supply center. We received a

demonstration of the Lock N'Pop adhesive, saw shrink wrap being put on a pallet, saw the computerized inventory system and overall, got a flavor for the types of items which go through the supply center.

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Keystone Dialogue on Navy Plastics
Meeting Summary
November 16, 1990

The meeting began with Dr. Michael Lesnick of The Keystone Center welcoming a few new participants: Jill Ballard from NAVSUP, Claudia McMurray from Senator Warner's Office, Betsy Schrader from the Center for Marine Conservation, and Michelle Mandell who is a fellow in the DOD Office of Legislative Affairs.

The agenda for the day was as follows:

1. Shipboard Plastic Recycling Project
2. U.S.S. Lexington Shipboard Plastics Waste Reduction Demonstration
3. Lunch/Plastics Videotape
4. Procurement Process
5. Update on First Report
6. Three Year Report to Congress

Shipboard Plastic Recycling Demonstration Project

The first presentation of the day was made by Craig Alig, from the David Taylor Research Center, on the Navy's experiences during the demonstration project on-board the U.S.S. Lexington. Craig began by focusing on the Shipboard Plastic Recycling Demonstration Project. (See attached handout Appendix A titled "Shipboard Plastic Recycling Feasibility Demonstration.") He noted that the U.S. Navy is the first organization in the United States which has successfully recycled post-consumer waste such as plastic wrap and milk bladders.

In the United States, the current plastic recycling efforts focus on two primary areas: 1)industrial plastic scrap, which is the bulk of what is recycled; and 2) PET (clear milk and soda bottles).

Most of the plastics generated by the Navy do not fit these categories. Navy-generated materials are primarily co-mingled plastics: polyethylene, PEC, PET and multiple resins. These are not the types desired by traditional plastic recyclers.

The Navy is undertaking the Shipboard Plastic Recycling Demonstration Project in conjunction with the Council for Solid Waste Solutions. The Council funded all of the processing and

products. The Council for Solid Waste Solutions has a no-cost contract with the Navy to help find solutions to the Navy's food contaminated plastics recycling problem.

As a part of the demonstration project the Navy collected 25,000 pounds of plastic. The waste plastic used for the demonstration project came from the U.S.S. Lexington and 25 Norfolk Base ships. The project had to be broadened beyond the U.S.S. Lexington because an insufficient amount of plastic was generated by that ship alone. Fifteen hundred pounds of plastic was collected from the U.S.S. Lexington and twenty-three thousand pounds from the Norfolk ships. After collecting the plastics from the ships, the Navy transported the plastic in refrigerated trucks to the processors because of the food contamination. The volume of the plastics generated was problematic for transport. Its large volume required numerous truckloads. In reprocessing the plastic, there is a 40-1 reduction in volume.

The plastics collected were shipped to three different companies:

-Riverhead Milling (Philadelphia, PA)
-Hammer's Plastic Recycling (Iowa Falls, IA)
-National Waste Technologies (Ronkonkoma, NY)

These companies are involved in various types of plastics recycling. The companies chosen were selected because they required no re-tooling to handle the post-consumer waste. Craig observed that apparently, there is very little profit margin on these products.

Riverhead Milling acquires expired shelf-life foods and uses the food to make animal feed. After processing the food, Riverhead was faced with the problem of disposal of the packaging materials. In response, and facilitated by an adjacent lumber yard, they developed a process which combines the plastic waste with sawdust (50% of each) to make "plastic" lumber.

Hammer Plastics recycles various types of plastics. According to Craig, the Navy's experience with Hammer Plastic has been somewhat problematic. Hammer Plastic has not let the Navy in to see the process being used to handle the waste plastic. The Navy is concerned because they think their post-consumer waste is being blended with industrial plastic waste.

National Waste Technologies handles assorted types of plastics. From the plastic it is producing lumber which is 100 percent plastic but is not as strong as the wood/plastic combination from an engineering perspective. Craig observed that from the Navy's perspective, the one hundred percent plastic lumber is better since it consumes more plastic.
There are other reasons that these three companies got involved in addition to the fact that re-tooling was not necessary. A

major factor for all of the companies' involvement was because the Council on Solid Waste Solutions wanted them to participate in the demonstration project. This appears to be the only reason why National Waste Technologies became involved. Beyond that, the reason for the involvement of the other companies varies. For Riverhead Milling, the Navy's plastics are relatively clean compared to what they normally use. Hammer Plastics Recycling, hopes that working with the Navy will allow them to get a sizeable share of the Navy's marine piling business.

From the plastic waste provided by the Navy during the Shipboard Plastic Recycling Demonstration Project, 80 to 100 picnic tables and benches have been made and returned to Norfolk and the U.S.S. Lexington so that the sailors can see the results of their efforts. Each has a plaque mounted on it identifying the source of the waste.

Craig went on to note that as an expansion of the project, the Naval Academy is going to recycle its plastic. The resulting lumber produced will be used to build piers and docks.

Craig indicated that the following lessons have been learned from the plastics recycling demonstration project:

1. The logistics of shipping, storage and handling of food contaminated plastics are prohibitive.

2. Recycling requires some secondary sorting of waste at shipside which is costly.

3. Individual bases are finding local recycling markets for high value plastics. However, those markets do not exist for the approximately 7% of the total plastics waste stream which is food contaminated waste.

However, Craig also noted that with the installation of the plastic processors on-board ship, the food contaminated waste will be easier to transport. A refrigerated truck would not be needed since much of the food contamination will have been neutralized by the heat of the plastic processor. The plastics in this format would be more acceptable to external processors.

The current iteration of the plastic processor would produce a compact square wafer, 3 inches by one quarter of the area of a tri-wall storage container. The squares would be collected and placed in a tri-wall storage container. The result would be a cubic pallet of material that can be easily delivered to the processing facility.

Craig concluded by identifying the next steps in the demonstration project. First, there will be a report from the Council on Solid Waste Solutions evaluating what has happened to

date. Next, there will be a cost/benefit study of Norfolk's recycling program. That report is due April 1991. It is already known that the Norfolk recycling program has generated $1 million as well as avoided significant landfill costs. The money collected is going to the base welfare and recreation fund (e.g., childcare, recreation facilities) and to base operations.

During the following discussion, someone wondered why the Council for Solid Waste Solutions might be pursuing this contract. It appears that a significant benefit is public relations. Craig distributed a copy of an advertisement which will be published in trade magazines. (See Appendix B)

U.S.S. Lexington Shipboard Plastics Waste Reduction Demonstration

Drew Jackson from the David Taylor Research Center (DTRC) then presented his observations on the overall effort to reduce plastics on-board the U.S.S. Lexington. To put the experience in context, he began by reviewing the specifics of the U.S.S. Lexington such as size, number of crew on-board ship, mission and length of time underway and how that makes it unique. (For specifics, see handout Appendix C attached.) Overall, Drew felt that the demonstration project on the U.S.S. Lexington represented a team effort across the Navy involving NAVSUP, DTRC, Supply Center Pensacola and the crew of the U.S.S. Lexington and others. (See complete list in handout.)

In the course of the demonstration project, Drew went to sea with the ship five times. He felt that it took a tremendous amount of time to get the project operational with the appropriate hardware in place and the necessary support of those on-board ship.

The demonstration project involved the use of several pieces of additional hardware specifically the solid waste pulper and the solid waste compactor. Additionally, the crew experimented with odor barrier bags to contain food contaminated plastic for longer periods of time.

The solid waste pulper used on the U.S.S. Lexington was a commercially available piece of equipment. It grinds up food, paper, and classified waste into a slurry which is discharged into the water. The slurry sinks and is not visible from the air. Pilots from the U.S.S. Lexington reported that they could not see any evidence of the slurry. Pulpable material is 60-70% of the solid waste stream. Previously, much of this part of the waste stream was incinerated. However, incineration could only be done when the planes were not flying which constrained the crews' ability to handle the waste. Since the slurry is pumped directly into the water, running the solid waste pulper does not interfere with flight operations. Supply Officer Arlen said that he felt that the solid waste pulper was the most effective

piece of equipment installed. The Navy has now developed its own version for use on-board ships. The only failures encountered during the demonstration were due to human error.

As a part of the U.S.S. Lexington demonstration, three solid waste compactors of different sizes (i.e., 2, 4, and 6 cubic feet) were installed. Commercially available units were used. These were considered as part of an interim answer to retention of plastics and other solid waste. The U.S.S. Lexington experience indicated that the 4 cubic feet compactor worked the best for food contaminated plastic. The slug generated was an appropriate size to handle. The 2 cubic feet unit was too large and the 2 cubic feet too small. The smaller unit ended up being used for the compaction of aluminum cans.

Different types of odor-barrier bags were used as a part of the U.S.S. Lexington demonstration. Several types of bags were used on-board the U.S.S. Lexington during the course of the project. In January 1990, the crew tested a bag developed at Rutgers University. These bags allowed the crew to keep the food contaminated plastics for 8 days. In August 1990, a new type of bag was tested. The crew then saved all food contaminated plastic generated for 30 days. The odor was evaluated daily. It was never found to be offensive.

While the odor from the food-contaminated plastic stored in the odor barrier bags was minimal, DTRC researchers are concerned about the pathogens which grow inside the sealed bags. These present a hazard to the crew members who work around the bags as well as others on-board the ship. The researchers are looking into ways to minimize the problem without creating a hazardous waste problem. They have identified a number of solutions but the solutions involve the use of substances which would make the bags a "hazardous waste."

The DTRC researchers concluded that the use of odor barrier bags may provide a viable interim solution until the plastic processor is installed on-board ships. However, the solution is not without a high cost to the Navy. The use of odor barrier bags was found to be very labor intensive because the compacted slugs of food-contaminated plastic waste have to be bagged which adds another step in the handling of the food contaminated plastic waste.

During the demonstration project the crew was able to keep food contaminated plastics for six days without the use of odor barrier bags. The key was proper sanitation of the Trash and Garbage Room, specifically washing down the floor periodically. Officers on-board ship were amazed at its neatness. This level of care was possible because it was a novelty for the trash crew to work with the personnel from the research center. It allowed

the researchers to get them to listen. The DTRC researchers exploited the novelty to their advantage.

Maintaining the Trash and Garbage Room at the level of cleanliness which allowed retention for six days and the processing of the plastic itself required a significant amount of labor from the crew. In essence, there was an ad hoc trash division on-board ship. Twelve individuals as well as an officer were involved full-time. In addition, there were 50 plastics control petty officers, one from each division who were used to train personnel and transfer information.

As the researchers and the Navy officers consider how to handle their plastics now and in the future, they are pondering the implications of the task on personnel and shipboard politics. The Navy will have to determine how to deal with the sense of professionalism of those assigned to the trash detail. It was noted that generally one does not join the Navy to be a "trash processor". Additionally, in the design of new ships, the processing center for waste recycling will be centralized. The presence and importance of that facility will change the internal politics of the ships.

In summary, the lessons from the U.S.S. Lexington experience are that education of the sailors is very important, delegation of responsibility is key, and an integrated approach to solid waste management is necessary. Additionally, commitment and support from the command level is a prerequisite for success. The "blue book" which tells sailors how to handle trash is being updated to include the lessons learned on the U.S.S. Lexington.

Drew Jackson noted that the Naval Supply Center side of the effort was critical to the project's success. He noted that NAVSUP and the Pensacola Supply Center put forth an outstanding effort to reduce the amount of plastic going on-board the ship. Plastic wrap was removed from items, paper containers were used, substitutes for plastic items were found and alternatives to shrink wrap such as Lock'n'Pop were tried but found to be ineffective in a high humidity environment such as Florida.

Similarly, Food Service personnel on-board ship tried various approaches to reducing the amount of plastic brought and used on-board. They tried using cloth aprons instead of plastic, ordered food items without plastic wrap and used an ethylene blanket in the cooler to prevent food spoilage. In a similar vein, plastic wrap on forms and publications was eliminated wherever possible.

As a part of the U.S.S. Lexington demonstration effort the Intra-Fleet Supply Support Operations Team (ISSOT) looked at how much plastic used in packaging and other ways was excess. They determined that 1100 pounds per day are generated on an average

carrier. Of that amount 121.5 pounds could be removed before the supplies were brought to the ship. However, the removal is very labor intensive and the plastic tends to be very clean and easily handled. Thus, the efficacy of removing that plastic may not be very high.

It does directly raise the unanswered question of what amount of manpower is required to process plastic and other aspects of the waste stream? The Navy's internal time management experts are now trying to determine the answer to that question. From the experience on-board the U.S.S. Lexington, it is the DTRC staff's opinion that it will require more people on-board ship to handle the trash.

In summary, Drew Jackson listed the lessons learned. First, patience is needed. It takes time for sailors to learn what is required of them. Second, NAVSUP needs to continue to make a concerted effort to get suppliers to decrease the amount of plastic which comes on-board. Part of that effort is already underway; NAVSUP is currently working with the General Services Administration to determine where plastic is not needed and to change the specifications for those items to eliminate the plastic. Third, he feels that with the installation of the hardware, a synergistic effect will occur. The demonstration on-board the U.S.S. Lexington was an attempt to test the systems theory of tackling the entire waste stream from beginning to end. The U.S.S. Lexington experience proved that it does work. Sailors can separate the waste stream and the amount produced can be reduced. The task will become easier when the plastic waste processor comes on line.

Drew Jackson concluded by noting that the success of the U.S.S. Lexington demonstration has helped to create demand for the new Navy equipment on other ships.

New Plastics Videotape

During the lunch break, the latest plastics videotape to be used on-board the ships was shown. It essentially tells the sailors that they are doing a good job, it is hard work, but the efforts underway will make the job easier. The plastics video will be distributed to all who received the first tape featuring Huey Lewis.

Procurement Process

Tom Scarano from NAVSEA presented an update on the procurement process underway for the new equipment. Armed now with the knowledge of what pieces of equipment will be used and their space requirements, he is now grappling with determining which ships will receive what equipment and when the equipment will be installed. His primary concern now is the scheduling of the

ships for the installation of the new equipment. Fifty-five different classes of ships will need to be considered for installation. Over these fifty-five classes of ships, there will be 440 ships to outfit. Each of the fifty-five classes of ships has different amounts of space available for the equipment. Thus, one of the first tasks has been to determine which pieces of equipment will go on each type of ship. With that information, he is trying to schedule when specific ships will receive the equipment. Tom noted that the timing of the installation of the equipment will also be influenced by when the equipment will be available in production quantities.

Tom then noted that the remainder of his presentation assumes an accelerated schedule that could be achieved with sufficient funds allocated. To date, the Navy has not received the money necessary to install all of the equipment needed, but the program has received "good" support from resource sponsors within the Navy. However, he cautioned that achievement of the goal and continued financial support is dependent upon events which shape DOD's and the world's reality. He noted that the schedule proposed is achievable but not unrealistic.

Tom Scarano provided a set of handouts to accompany his presentation. (See Appendix D) They illustrate the number of pieces of equipment per ship type, as well as how many pieces will be installed during each fiscal year. For his purposes, the fifty-five classes of ships have been put into seven categories. The preliminary allocation of plastic processing equipment will be to retrofit existing ships.

Tom pointed out that the contract for the plastics compactor should be granted by February or March 1991. The contract package consists of 800 drawings which explain all aspects of the compactor. The contract has been "put out" for bid. One set of drawings is provided to each bidder. The Navy has received 65 solicitations.

Tom noted that it is clear from the schedule proposed that 100% reduction in plastics discharge should be achieved by the year 2000. Currently, the Navy is at 30 percent discharge. The remaining 30 percent is primarily food contaminated plastics.

The cost of this effort to equip the Navy ships is estimated to be $370 million for research and development, acquisition, and installation during the period from 1990 to 2001. The breakdown is as follows: $20 million for research and development; $15 million for procurement; and $200 plus million for installation.

During the discussion, Tom was asked if there was anything the Congressional staff or the participants from environmental organizations could do to help keep sufficient funding levels for the program. The response was that participants' environmental

organizations need to learn more about the budget process and then to do a better job of lobbying on the budget. It was then suggested that the Navy help the environmental organizations in that task by educating them about the budget. Additionally, it was noted that the political appointees within DOD need to hear from Congress that the environment is important. It was noted that pressure on the Navy to adhere to environmental compliance applied by those outside the Navy would be helpful to those within. One mechanism would be congressional oversight hearings. It was suggested that joint oversight hearings held by the Armed Services Committee and the Environment Committee would be the kind of activity that might provide visibility and mutual awareness.

Update on the First Report

Craig Alig then brought the group up-to-date on the status of Navy's efforts to implement the first Keystone Report. Craig explained that the format of the update report will be to repeat each recommendation from the first report and then outline the current effort. A relevant photograph, chart or table will also be provided. (See attached handout, Appendix E). Craig informed the group that his assistant, Ensign Mercer, was re-assigned by the Navy, thus, is no longer available to work on the task. Craig is trying to locate someone else to finish the effort. Currently, the entire first draft is done. He is aiming for completion by January 1991.

After Craig finished his presentation, Mike Lesnick noted that the completion of the update is very important to those involved in the Dialogue since it will provide them with a basis for evaluating the Navy's effort. Mike observed that there has been a significant amount of time invested by all participants. However, the non-Navy participants will be asked questions by Congress about their assessment of the Navy's efforts if the Navy is not going to meet the five year deadline. The information contained in a status report of the Navy's efforts to implement the first report combined with the information within the three year report to Congress will be quite useful to the non-Navy participants in developing their response.

Three Year Report to Congress

Larry Koss presented an outline for the three year report which is due January 1992. (See attached outline, Appendix F) He then noted that the Navy's intent is to prepare a report that will be as concise as possible. The main message of the report will be that the schedule for compliance presented within the report is the best schedule the Navy can achieve. He feels that efforts to date and the schedule outlined by Tom Scarano are a realistic assessment of when changes can be expected to occur.

Since the outline is fairly self-explanatory, Koss identified a few key points. First, he pointed out that the big challenge for the Navy will be the small ships which have limited space. They will have the hardest time reaching compliance.

Second, he noted that the three year report will highlight the number of ships which are in 100 percent compliance currently because they are going out on short trips (3 days or under). As a part of the subsequent discussion, it was suggested that the report needs to make the distinction between actual compliance and theoretical capability (if not underway, ships are in 100% compliance.)

With that, comments on the outline were made by those in attendance. It was felt that the following question needed to be addressed within the report: What efforts can one make between now and 2000 to reduce the remaining 30 percent?

Similarly, it was suggested that efforts such as source reduction and substitutions to change the supply side of the equation need to be stressed within the report. It was noted that such efforts will reduce the amount of plastics needing to be stored on-board.

It was also suggested that as a part of the report's preparation, the operational study done by Fred Chitty (it established the 3/20 day rule) should be refined. One aspect of that would be to compare the amount of plastics generated pre-MARPOL and currently.

As a part of the discussion, it was also suggested that the report should include other alternatives which could reduce the waste stream more quickly but might be more expensive.

Concerns and Issues of the Environmental Community

After the initial reactions to the Three Year Report to Congress outline, Mike Lesnick asked participants from environmental organizations for their specific reactions and concerns. It was observed that it has been 11 years since the implementation of MARPOL. If Navy compliance is to be achieved by the year 2000 it will be achieved 6 years past the due date. Environmental participants present noted that the Three Year Report to Congress needs to clearly put forth why these delays have occurred. It was also suggested that the report needs to identify how the Navy plans to overcome the impediments it faces to the achievement of full compliance (e.g., supply change problems where the Navy should point to industry and the need for additional recycling capacity and source reduction).

It was also suggested that the report should clearly present the nuts and bolts of the Navy's effort and explain the problems encountered in a manner understandable to the public.

Within the discussion, the idea of a separate report by environmental participants to be used as a basis for testimony was suggested. It could focus on the problems encountered on the supply side of the equation. A decision as to whether to do a separate report was not reached.

With that discussion, Mike Lesnick asked all of the participants if it would be useful to review the Navy's draft report prior to its release. The response was "yes."

With agreement on that, some of the participants suggested that they needed more information on what the Navy was doing to reduce plastics on the supply side of the equation. The participants decided that a formal briefing from NAVSUP would be helpful. To facilitate that effort, Jill Ballard requested that participants send their concerns to NAVSUP within ten days of the meeting and copy them to Martha Tableman at The Keystone Center. (To date, none have been received. Please send by February 26, 1991.) The next meeting is scheduled for Friday, March 8, 1991 from 9:30 a.m. to 4:00 p.m. at NAVSUP. Directions and exact location are enclosed. A draft of the Navy's Three Year Report is to be mailed out to Dialogue participants two weeks prior to the March meeting.

DRAFT

KEYSTONE DIALOGUE ON NAVY PLASTICS

Meeting Summary
March 8, 1991

The Keystone Dialogue on Navy Plastics met at Naval Supply Systems Command on March 8, 1991 for an update on NAVSUP's Plastic Removal in Marine Environment (PRIME) program and to review the first draft of the Navy's Three Year Report to Congress. The meeting began with Rear Admiral James E. Miller, Vice Commander of NAVSUP, greeting the Dialogue members. He is very supportive of the Navy's efforts to reduce the amount of plastic on-board ships. In his opening comments, Rear Admiral Miller directed Linda May to review Desert Storm actions in terms of plastic useage and disposal when the ships return to home port.

The briefings by NAVSUP were very well received and indicated they have accomplished much in the past year. For example, the Inventory Control Points (Navy Ships Parts Control Center and Aviation Supply Office [SPCC]) are conducting reviews of packaging requirements for over 740,000 Navy-managed items. To date, they have been successful in reducing or eliminating plastic in packaging requirements of Navy consumables in over 120,000 items. They estimate that a total of 220,000 items can be reviewed in FY 91. SPCC has recently developed a formula to measure what this reduction/elimination equates to in weight. Initial computations for only 14,000 line items is over 147,000 pounds per year. This is plastic packaging that otherwise would have gone on-board and would have required plastic waste management (i.e., segregation and storage). Progress is being made as well with Defense Logistics Agency (DLA) and General Services Administration (GSA) items, which comprise the bulk of what the Navy uses. Commitment to PRIME initiatives has been given by both organizations and specification reviews are ongoing to reduce or eliminate plastic where possible.

Representatives from the U.S. Army Research, Development and Evaluation Center, Natick, MA, provided a food program update that included changes to food management procedures, specifications, and packaging to assist in the food-contaminatedd plastics generated on-board ship. They also provided a briefing on research and development of biodegradable packaging materials. Congress appropriated $2.9 million to Natick for development of biodegradable plastic using starch-based polymer technology to assist the Navy in the control of disposing of plastic wastes at sea. Their program activities will include, but are not limited to, deep ocean exposures, marine bioassays, nutritional feeding studies, anmd production of items. (For additional information on the presentations, see attached hand-outs which were provided at the meeting).

After lunch, the group's attention turned to the Navy's draft Three Year Report to Congress. (If you did not receive a copy, please

contact Helen Quam at The Keystone Center 303-468-5822.) The Dialogue participants made numerous recommendations for changes to the report. Some of the recommendations addressed content and others addressed format. After examining the draft report, it was suggested that the executive summary be shortened. Similarly, it was suggested that there be additional discussion of interim solutions such as odor barrier bags (now in production at the David Taylor Research Center) which could be used until the plastic processor is placed on all ships. It was also suggested that the report should include a discussion of what would be needed in terms of manpower and money to comply with the five year deadline.

In terms of layout, the participants thought that the use of pictures would help to illustrate the points being made as would a clear delineation of headings to identify main categories.

As a part of the discussion, the impact of Desert Storm on the plastics program was clearly identified. It was noted that the installation schedule has been delayed one year due to funds being diverted to the Desert Shield/Storm effort.

At the end of the discussion, Larry Koss reminded the Dialogue participants that any additional comments would be welcome. It was suggested that comments should be faxed or sent to Larry Koss or Nancy Stehle.

With the end of the presentations, Mike Lesnick noted that the presentations by NAVSUP had been very helpful as had the discussion of the draft Three Year Report to Congress. Mike then raised the question of "What is a useful way for the Dialogue to proceed?" In response the Navy personnel noted that they continued to be challenged in their efforts to inform Navy personnel about the need to reduce and recycle plastic on-board ship. They thought that assistance from Dialogue participants who do public education would be helpful. Nancy Daves volunteered to help. On a related matter, CMDR Vizzier noted that a new plastics poster was needed. Betsy Shrader and Sharon Stewart volunteered to help with that effort.

As the discussion proceeded, it was also suggested that communication between the Navy and the Dialogue participants needed to occur outside the context of Dialogue meetings. It was suggested that the Navy should use the Dialogue participants as a source of advice and counsel on the Three Year Report to Congress and other matters. To encourage the two-way flow of information, Linda May said she would put the Dialogue participants names on the mailing list for NAVSUP updates which are mailed quarterly. As an example of the kind of positive interactions which could occur outside of Dialogue meetings, Sally Lentz offered to provide some of their staff scientist's time to the folks at NATICK to consult on the biodegradable toxicity studies.

At the end of the meeting, participants were asked to save June 24th for the next meeting. It was suggested that the meeting be held in the afternoon and evening at the David Taylor Research Center.

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KEYSTONE DIALOGUE ON NAVY PLASTICS

June 26, 1991
Meeting Summary
David Taylor Research Center
Annapolis, Maryland

Mike Lesnick welcomed everyone and outlined three goals he saw for the meeting. First, the Dialogue group would have another opportunity to discuss the Navy's Three Year Report to Congress. Second, the group would have a chance to learn about the results of the Navy's demonstration recycling program involving the U.S.S. Lexington and ships at Norfolk Naval Station. Last and the reason the meeting was being held at the David Taylor Research Center, the group would be given a tour of Craig Alig's laboratory and a chance to see the plastic processor, the pulper and compactor at work. Linda May of NAVSUP requested that some time be spent on a discussion of the current definition of plastics which NAVSUP is has found problematic.

Before beginning the discussion of the Three Year Report to Congress, Mike Lesnick noted that once again we have a new member to the Dialogue group. Phil Pfeil was present to replace Rick Vizzier from U.S. Atlantic Fleet (CINCLANTFLT). Mike also commented that Madeline Creedon from Senate Armed Services Committee had expressed interest in joining the group. Mike then asked those who have been involved since the beginning of the Dialogue to give their thoughts and comments on what has made the dialogue process work so that new members can learn from their experience.

A participant from the environmental community noted that he felt it was important to maintain open lines of communication between the different members of the dialogue group in order to make the most of the process. A Navy representative stated that she felt it was important for the environmental community to feel free to critique the Navy. She felt that hearing criticism is better than allowing them, the Navy, to pursue a path some might feel strongly antagonistic towards. She had found it to be more useful to discuss differences early in the process.

Mike Lesnick reinforced those observations. He noted that the heart of the process is an education process which works both ways: the Navy learns about the political and ecological implications of its efforts while the environmentalists and congressional staffers learn about the complexity of Naval systems. Continued communication is critical for the process to be fruitful for all involved.

Navy's Three Year Report to Congress

A draft of the Three Year Report had been distributed to Dialogue members just prior to the March 8, 1991 meeting. Since members were able to review the document more thoroughly in the interim, it seemed prudent to obtain any additional comments for incorporation into the final report. The report is due to Congress by the end of 1991.

The following points were made during the discussion of the report:

- Since the Executive Summary is all that many people will read, it needs to have the key points clearly stated.

- Interim solutions such as the odor barrier bags need to be identified and explanations provided for why they are or are not feasible including cost and manpower figures. This includes discussions of practices such as washing containers, the use of garbage barges to offload trash, etc.

- In order to keep the report manageable, reliance on appendices was suggested.

- The use of pictures to illustrate the problems and possible solutions was strongly encouraged. (e.g., picture of volume of garbage and size of plug once compacted)

- Further elaboration of the problems the Navy would encounter if they tried to meet the five year deadline would increase the reader's understanding since the problems foreseen are with feasibility not finances.

- Need to include a discussion which illustrates that there is currently compliance on non-food contaminated waste.

The Dialogue group noted that they would like an opportunity to review the Three Year Report again before it is finalized. Larry Koss noted that he intends to have a revised draft completed in approximately six weeks.

Shipboard Recycling Report

The report on the recycling efforts on-board the U.S.S. Lexington and the Norfolk ships was distributed to the group for their information and use. (For those who did not receive a copy, they should contact Craig Alig.)

Definition of Plastics

Linda May began by stating that NAVSUP is encountering problems with the definition of plastics being used by the Coast Guard. Annex V of the MARPOL treaty did not did contain a definition for plastics. The Coast Guard is using the following definition for plastics:

> Plastic means any garbage that is solid material, that contains as an essential ingredient one or more synthetic organic high polymers, and that is formed or shaped either during the manufacture of the polymer or polymers or during fabrication into a finished product by heat or pressure or both.

It was noted that the current definition has the potential to cause problems for the Navy in its efforts to reduce the use of plastic on-board ships since the definition calls anything that contains a heat generated polymer a plastic. In looking for alternatives to plastics, NAVSUP has encountered problems with items which contain cellulose because they contain a heat generated polymer. Thus, according to the definition they cannot be dumped overboard or pulped. Similarly, degradable plastics are considered plastic therefore cannot be dumped overboard.

The NAVSUP staff contend that the definition should be clarified to address the issue which is the environmental fate of discarded materials whether they are plastic or not. Thus degradability and toxicity become the questions to ask.

In response to the Navy's concerns about the definition, the environmentalists raised questions about the toxicity and the speed of degradability of degradable plastics and items such as cellulose. They suggested that it would be better to do a product by product exemption from the Coast Guard definition and to allow the use of degradable products only if there were no other substitutes.

Lab Tour

With the conclusion of those discussions, the group was given a tour of the lab facilities. Demonstrations were given of the plastic processor, the pulper and the compactor.

Next Steps

At the end of the meeting, it was decided that once the group had received and reviewed the next version of the Navy's Three Year Report to Congress a meeting to discuss the report would be scheduled if it was needed. The Keystone Center staff will contact Dialogue members to determine possible dates.

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